Laboratory Equipment Manufacturer
www.mrclab.com

Multy purpose Centrifuge Max Capacity 4X750ml

Operation Manual

LGCEN-408

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

3, Hagavish st. Israel 58817 Tel: 972 3 5595252, Fax: 972 3 5594529 mrc@mrclab.com

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LGCEN-408

USER MANUAL

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1. General Considerations

As a bench top centrifuge, user manual is for who learns equipment for the first time
This user manual gives informaton of troubleshooting & maintenance
and precaution & instruction for user to start equipment

Read this user manual carefully to make full use of performances
Keep this user manual on a convenient place so that you can refer to it immediately
when you need explanation about particular function of equipment or you face difficulties

This user manual shows notice for safety instructions
Read this user manual before you control equipment and follow instructions

1-1 Components

Description	Q'ty
Main body	1
User manual	1
Hexagon wrench	1

Packing Inspectio

1. Check packing conditions very carefully after arrival of centrifuge

2. Contact MRC Co Ltd immediately if damages found

3. You can get contact details on packing boxes and outer cover of manual

1-2 Using & Storage Condition

—Using condition
Room temperature within 5℃ ~ 35℃
Maximum relative humidity 30% ~ 85%
Air pressure 500 ~ 1060 hpa

—Storage & transportation condition
Surrounding temperature −10℃ ~ +40℃
Relative humidity 10% ~ 90%
Air pressure 500 ~ 1060 hpa

2. Installation Directions

2-1 Safety requirements

Centrifuge involves elements of risk all the time as it utilizes a high speed body of rotation
Follow precautions and all the safety requirements described on this user manual to prevent any damage and failure of equipment and loss of lives

1) Centrifuge should be placed on flat place to maintain level. Big vibration is caused by operation of equipment in the condition of spindle inclined

2) Check voltage to be used before centrifuge is connected to power supply.
Wrong voltage can damage equipment

3) Use rotor provided by MRC Co Ltd and parts and accessories recommended.
MRC Co Ltd is not responsible for damages of equipmet and accidents caused by using parts and accessories not recommended

4) Understand property of matter fully and take needful safety actions in case you perform centrifugation of dangerous materials such as pathogenic, toxic and radioactive substances

5) Remove contaminants completely and take needful actions such as ventilation or isolation of centrifuge in case centrifuge is contaminated with dangerous materials such as pathogenic, toxic and radioactive substances

6) Do not perform centrifugation of materials capable of producing volatile and explosible steam

7) Do not operate equipment more than maximum RPM allowed by rotor installed

8) Do not decelerate or stop rotor rotating with hands

9) Rotor should be used after balancing of symmetry between weight of samples to be used

10) Rotor should be fixed into shaft and its lid should be tightened completely
Otherwise, the lid can be taken off during rotation

11) A trained and qualified technician should perform repairing directions not mentioning on this user manual

12) User should remove contaminants completely in advance in case user requests repairs to a qualified technician

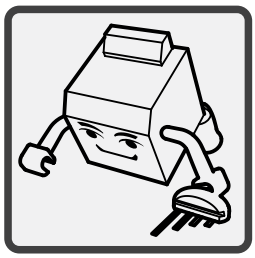
13) Rotor and chamber should be kept dry all the time before use of centrifuge to make long period use of centrifuge and maintain the best operating conditions

14) Pay attention that aluminum rotor has a chemical reaction and starts to be corrosive if aluminum rotor contacts laboratory cleaning liquid, cesium, silver, and (especially chloride ion) of strong acid, strongly alkaline or strong alkali

2. Installation Directions

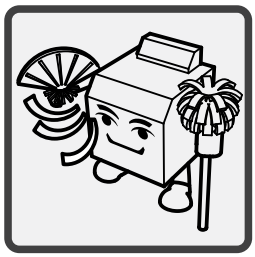
2-2 Installation directions

Installation on hard and flat ground



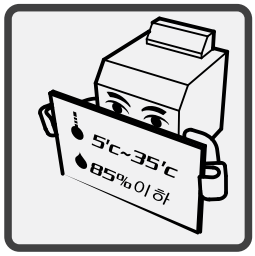
Centrifuge should be installed on hard and flat ground. In case centrifuge is located on inclined place, spindle can be bent due to heavy weight of rotor as centrifuge is rotating
in condition of spindle inclined for long period of time

Smooth air circulation



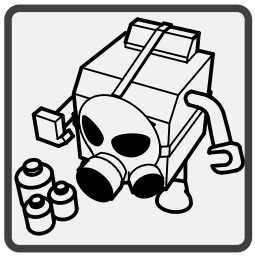
Centrifuge should be located in leaving 30 cm of room from both sides and the back for smooth air circulation
Especially, air circulation is not going smoothly if air vent on the case is covered with cloth or blocked by other equipment
Avoid dusty place to install centrifuge

Constant temperature and humidity



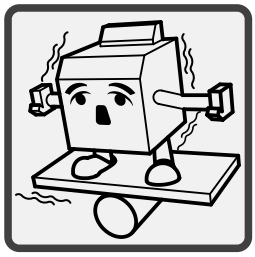
Centrifuge is influenced by external environment such as temperature or humidity as it is controlled by a high degree of electromagnetic controller.
Do not install centrifuge close to direct light or heater
Keep centrifuge in proper temperature and humidity

Place unable to produce corrosive gas



Install centrifuge on the place unable to produce corrosive gas
Rotor and spindle can be corrosive and metal parts can be damaged if centrifuge contacts pyrosulfuric gas and chloric gas

Balancing



Centrifuge should be leveling for spindle of equipment to be vertical to the ground.
Balance a centrifuge by using a water level if required

2. Installation Directions

2-3 Check points

Check any damage of goods very carefully after arrival of centrifuge. Contact MRC Co Ltd immediately if damages found. You can get contact details on outer cover of manual

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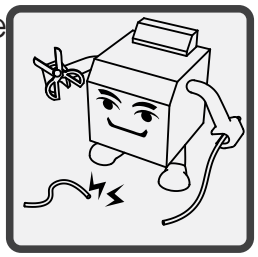
⚠ Do not open a lid manually when a rotor is rotating
Do not use emergency lid lock device except emergency

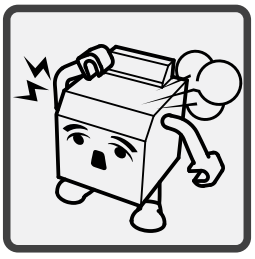
⚠ Do not operate equipment more than maximum RPM allowed by rotor installed
If centrifugal force more than allowable tensile strength is applied to a rotor, corruption or break of rotor can happen as its shape
is designed as per its allowable tensile strength

Short circuit breake



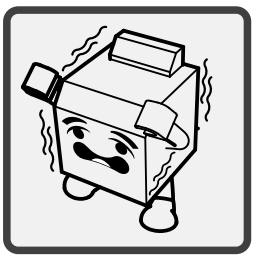
1. Short circuit breaker is installed into a centrifuge
2. If overload or overvoltage flow from a centrifuge, voltage is cut off to prevent it from damage by thunderbolt or overvoltage

Lid lock system



1. If a lid opens, rotation of rotor stops rapidly by a lid control sensor and if a lid does not close, equipment does not work
2. Automatic lid lock does not open during operation expect intentional open by tools

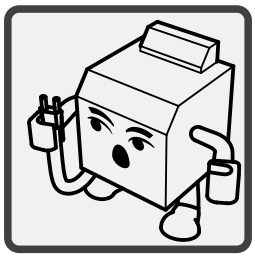
Abnormality of vibration



1. If a centrifuge moves seriously out of balance more than a certain standard during rotation of rotor motor also moves
   At this moment, a centrifuge senses a danger by measuring vibration of motor and stops with an alarm This safety system prevents unexpected accidents while an experimenter is out after starting a centrifuge

2. Installation Directions

2-4 Electrical requirements



Follow a rated voltage marked on the label of equipment for normal operation of equipment
Contact a local electric utility company or customer service center marked on the outer cover of manual to check whether
power supply in use is appropriate for a rated voltage of equipment

Warning : This product must be properly earthed

Product is provided with plug including earth pin and this plug can be inserted to earthed system of electric outlet
In case this plug is not applicable to outlet in use, change to earthed system of electric outlet
At this moment, be careful you do not receive an electric shock and contact an experienced eletrician if required
Do not use earthed system of adapter plug for electric outlet without earth terminal

Install an emergency switch on a distant place from centrifuge to disconnect power supply in case error happens,
It is good to be placed on the side or the outside of the exit of laboratory
According to IEC61010-2-020, 30cm of a safe distance around centrifuge should be assured during operation
Nothing should be put on this safe distance in case it is destroyed

Electric safety information

Use a power cord only provided with equipment
Do not use an extension cord. Contact an experienced electrician in case you check earthed system of electric outlet
You can receive an electric shock if you connect an earth wire of equipment wrong
Install equipment not to be stepped on a power cord
Do not put anything on a power cord
Do not block a ventilating opening
Do not insert anything into a slot or hole of equipment
If you have the following emergencies, shut off the power supply and pick out the power cord from outlet and contact our customer services
:Abnormal sound or smell from equipment
:Damage or wear of a power cord
:Breakdown of circuit breaker, fuse or safety device
:If you spill liquid on equipment
:If equipment is exposed to water
:If Some of equipment has been damaged

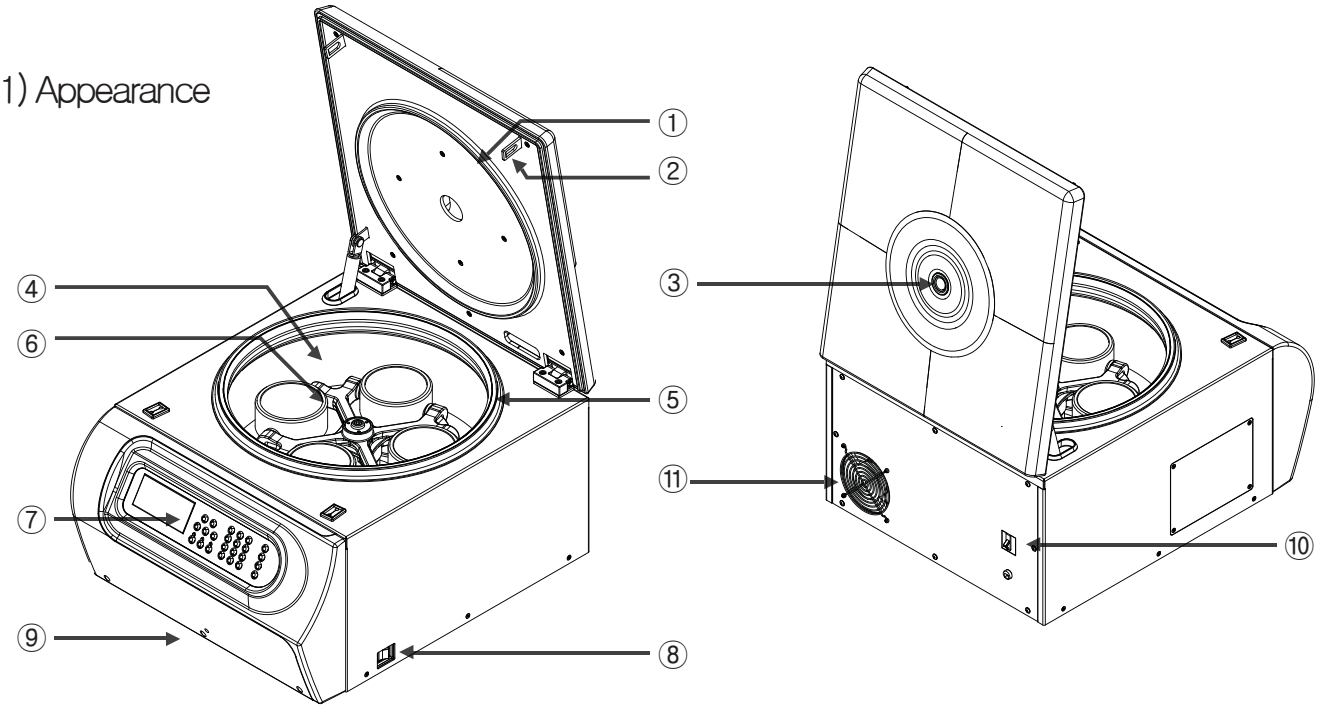
3. Inspection of Operation

3-1 Specification

Max. Rotational s peed	Swing Rotor 4,000RPM Fixed Angle Rotor 8,000RPM
Max. C entrifugalr elative force	Swing Rotor 3,515xg Fixed Angle Rotor 8,279xg
Max. Ca pacity	Fi xed Angle Rotor 85m l × 6 Swing Rotor 750ml×4
Acce leration	10 steps
Dece leration	10 steps
Power consumption	AC 220V , 60Hz , Si ngle P hase, 2.3KW
Motor drive	BLDC / 1.5KW
Programmabili ty	100 Pr ogram m emories
Dimension	530(W)× 676(D)× 400(H)/mm
Weight	70Kg(with S750T 4B+B750) 61Kg(without S750T 4B+B750)

3-2 Structure Descriptions

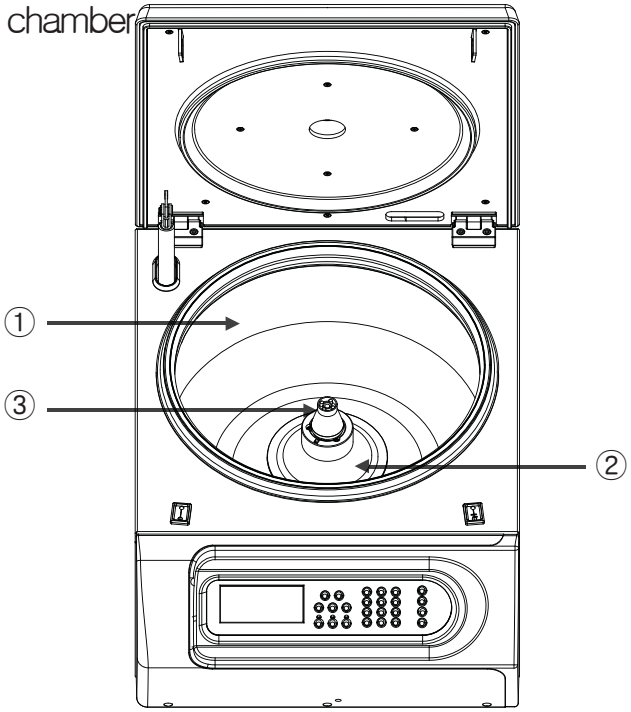
1) Appearance



① Lid: Lid protects the inside of the chamber and a rotor from coming out in danger
② Lid lock: This is a fixed part to keep the lid shut
③ RPM measuring window: This is a part measuring speed of rotor by a digital tachometer
④ Chamber: This is where a rotor is installed and it rotates
⑤ Lid packing: This closes off between inside and outside
⑥ Rotor: This is connected to a spindle and hangs adapters containing tubes and rotates
⑦ Controller: This is where you can set up data such as RPM, TIME, Temperature and etc.
⑧ Power switch: This is where you can switch ON/OFF after you plug in
⑨ Emergency Lid Open system: This is where you can open a lid manually in case of emergency such as power failure
⑩ Short circuit breaker: This shuts off power supply in case of short circuit of wiring or overload
⑪ Cooling fan: This emits air out of the product

3. Inspection of Operation

2) Inside structure of the chamber



① Chamber: This protects the inside of the chamber and a rotor from coming out in danger
② Motor cover: It prevents foreign substance from coming inside
③ Motor spindle: This makes rotor rotate

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There is a concern you can get injured if you try to close a lid grabing by its sides with hands
Accordingly, put hands up the lid and push it down for about two(2) seconds
Then, operate equipment after you make sure the lid shut

3. Inspection of operation

3-3 Rotor

:Clean a motor spindle and rotor holes with a dry cloth before you install a rotor
:When you tighten a rotor on a motor spindle, temperature of a rotor
and a motor spindle should be between 10℃ and 30℃
:Tighten a rotor screw turning clockwise with a hexagon wrench after you install a rotor on a motor spindle
:When you take a rotor out, turn a rotor screw counterclockwise with a hexagon wrench

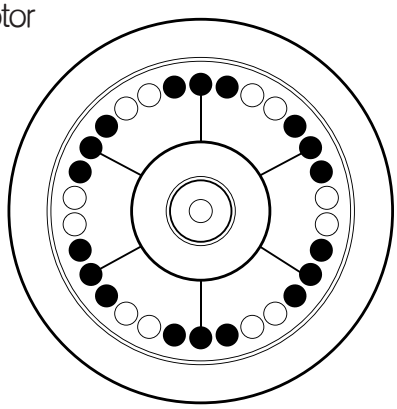
1) Applying load to a rotor

:Tubes should be placed on a rotor symmetrically
Recommended tubes should be only placed on a rotor
:Weight difference between tubes containg samples should be as small as possible to minimize noise and extend life of drive
:Same type of tubes should be placed on a rotor due to a reason of mechanical stability
:Clean rotor holes before you insert tubes

⚠	Rotor, tube rack(adapter), tube and adapter set recommended by manufacturer should be used Make sure that you place all the tube racks(adapters) properly and they moves well
⚠	In case of big size of tube, take a swing test first with empty tubes
⚠	Do not use rotor and bucket with a visible cossosion or mechnical fault

2) Tubes arrangement

Angle rotor



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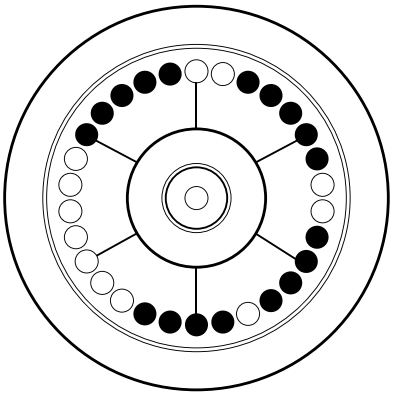

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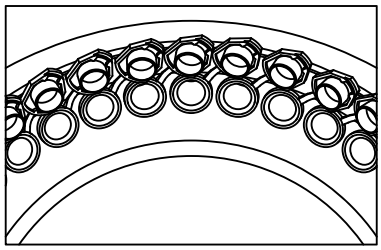
Same volume of sample should be put on tubes after you measure it exactly
Tubes should be placed on a rotor symmetrically
At this moment, if volume of symmetrical tube is different, a rotor and an axis of rotation can be damaged due to severe vibraiton during rotation

Location of centrifuge tubes facing each other should be symmetrical even though tube's quantities are same
If tubes are not symmetrical in quantity, new tubes should be inserted to keep balance

User is encouraged to use a scale to minimize the difference of volume between tubes containing samples

3. Inspection of operation



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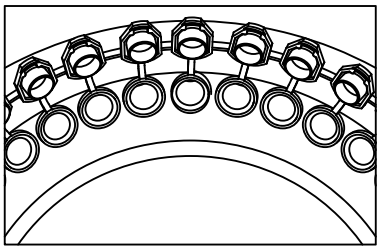

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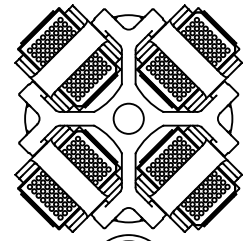
In case you open tube's lid for centrifugation by using a spin column, please lean tube's lid against the edge of a rotor for exact centrigugation and make sure type of tubes are same and close the lid of rotor

This instruction should be applicable just in case you use tubes provided according to purpose of kit manufacturer

Swing bucket rotor



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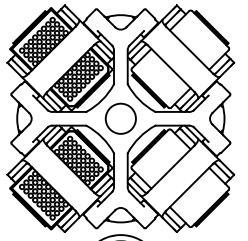

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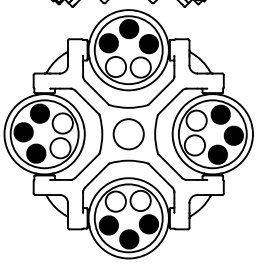

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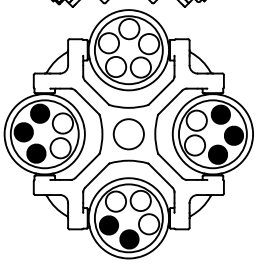

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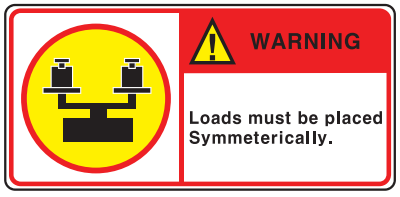
Make sure cleanliness of the inside of bucket and clean foreign substances with a dry cloth. In case you use two buckets, make sure the buckets are placed on a rotor properly and take a swing test manually
Adatpers, plates and tubes should be placed on a rotor symmetrically
At this moment, if volume of symmetrical tube is different, a rotor and an axis of rotation can be damaged due to severe vibraiton during rotation

3) Safety Label attached to products



	Mark indicating danger and warning
	Mark indicating a place in danger of electric shock
	Warning! In danger of injury due to asymmetric installation of a rotor Make sure a rotor is tightened up before start Make sure a lid of rotor is tightened up before start Make sure of tubes arrangement before start :Same tube buckets and plates should be placed on a rotor symmetrically :Make sure of use of adapters with suitable tubes or plates :Make sure of use of same type(weight, material/density, volume) of tube or plate all the time :Make sure you check balance of adapters, tubes or plates by using a scale and they become symmetric

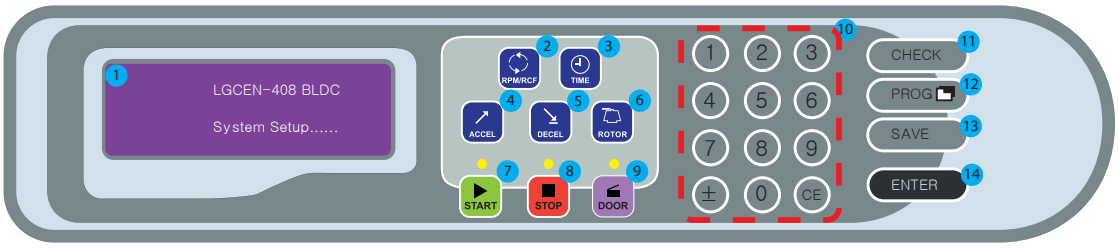
3. Inspection of operation

3-4 Function test

Perform a normal test toward maximum speed of a rotor
Check out whether equipment works under a lid open and whether a lid opens during operation

3-5 Instructions

1) Controller



No.	Button		Function
1		<Display>	Set-up information, operating condition is displayed .
2	RPM/RCF	<RPM>	This button is to input RPM. It is allowed to input maximum 8,000RPM
3	TIME	<TIME>	This button is to input TIME. It is allowed to input maximum 1 hr 59 min 59 sec
4	ACCEL	<ACCEL> <YES>	. It is allowed to input 10 steps of acceleration and input 0 to 9 by using numerical key <9 is the fastest step>
5	DECEL	<DECEL> <NO>	0| It is allowed to input 10 steps of deceleration and input 0 to 9 by using numerical key <9 is the fastest step>
6	ROTOR	<ROTOR>	This button is to input rotor data .
7	START	<START>	This button is to rotate a rotor
8	STOP	<STOP>	This button is to stop rotating a rotor .
9	DOOR	<DOOR>	This button is to open a lid
10		<KEY>	This is an input button when you set up data
11	CHECK	<CHECK>	This button is to check setting values during operation
12	PROG	<PROG>	This button is to recall programs memorized
13	SAVE	<SAVE>	This button is to store programs
14	ENTER	<ENTER>	This is an confirmation button when you set up data

3. Inspection of operation

2) Saving programs

RPM/RCF	Press <RPM/RCF> button and input the desired RPM by using numerical key and press <ENTER> button
TIME	Press <TIME> button and input the desired time You can set time up to 1 hr 59 min 59 sec and it moves in order such as hour, minute, and second by pressing <ENTER> button. You can set time at desired mode by using numerical key
ACCEL	Press <ACCEL> button and input the desired acceleration step by using numerical key and press <ENTER> button
DECEL	Press <DECEL> button and input the desired deceleration step by using numerical key and press <ENTER> button
SAVE	Set all the desired values and press <SAVE> button
1 2 3 4 5 6 7 8 9 ± 0 ⇐	Select number to store programs by using numerical key (You can select Number to store from 0 to 99)
ENTER	You can complete save mode by pressing <ENTER> button

3) Program Recall/Input

PROG	In standby mode, press <PROG> button and input program number to recall and press <ENTER> button

4) RPM/RCF input and interconversion

RPM/RCF	In standby mode, press <RPM/RCF> button and input the desired set value by using numerical key In case the initial screen indicates the mode of inputting RPM, the screen indicates the mode of inputting RCF by pressing <RPM/RCF> button twice briefly

5) Time input

TIME	In standby mode, press <TIME> button and input the desired set value by using numerical key You can set time up to 1 hr 59 min 59 sec *In operating mode, you can set <TIME>

6) Current time setting

TIME	1. In standby mode, you can check current time by pressing <TIME> button for about three(3) seconds 2. Method of current time setting In standby mode, **Check RTC** is displayed on the screen by pressing <TIME> button for about three(3) seconds. Then, press <ENTER> button and input current date & time and press <STOP> button

7) RPM acceleration/deceleration settings

ACCEL DECEL	In standby mode, press <ACCEL>/<DECEL> button and input the desired step of acceleration/deceleration by using numerical key and press <ENTER> button NOTE: Step of acceleration/deceleration is 0 ~ 9 0 is the slowest step and 9 is the fastest step and 0 is natural brake when decelerating Recommended step of acceleration/deceleration is 5

3. Inspection of operation

8) Manual Rotor Recognition

ROTOR	If you press <ROTOR> button for about three(3) seconds in standby mode, rotor ID is recognized at 100rpm *Do not change rotor ID intentionally as rotor ID provided by MRC is recognized automatically

9) PULSE RUN MODE

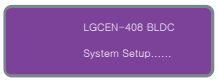
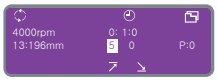
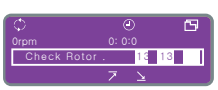
5	1. If you press <No. 5> for about five(5) seconds, PULSE RUN mode comes up 2. Centrifuge runs by RPM of standby mode, for example, if the display show 4000rpm, a rotor goes up to 4000rpm and it decelerates immediately You can use PULSE RUN MODE after you set a particular RPM for using the particular RPM

10) Automatic Rotor Recognition

If you press <START> button, rotor ID is recognized automatically. Accordingly, centrifuge distinguishes automaticallly and decides whether it operates or not after it compares with the initial rotor ID
If rotor ID is different each other, input the current rotor ID by pressing <ROTOR> button for about three(3) seconds

11) Trial operation sequence

Trial operation sequence
:Store program No. 2 with trial set value->S750T-4B(No.13), 4000RPM, 1min, acceleration 5, deceleration 5

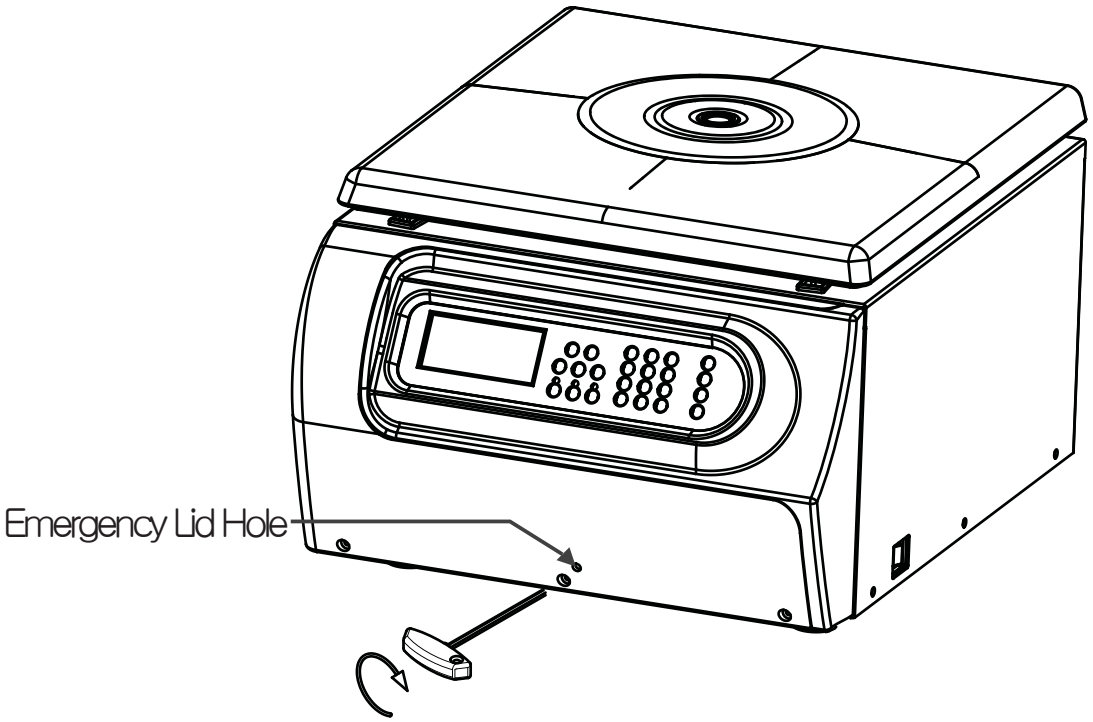
Display	Button	Instructions
START	Circuit breaker	Switch on the circuit breaker on the back of equipment
	POWER S/W	Switch on the power on the left side of equipment
	ROTOR	Install a rotor and accessories on equipment after you clean foreign substances on a rotor and spindle. Make sure that a locking bolt of a rotor should be tightened completely
		Close a lid
		Press <RPM/RCF> button and input "4000" by using numerical key and press <ENTER> button
		Press <TIME> button and press <ENTER> button to move to input mininute and input "1" Then, press <ENTER> button twice
		Press <ACCEL> button and input "5" by using numerical key and press <ENTER> button
		Press <DECEL> button and input "5" by using numerical key and press <ENTER> button
		Set all the desired values and press <SAVE> button and input "2" by using numerical key and press <ENTER> button
		Press <START> button after you check set values with the naked eye
	Rotor Automatic Recognition	Rotor ID is recognized automatically and centrifuge starts to run

4. Cleaning and Maintenance

Emergency lid open system

In case a lid closes due to power failure, activate emergency lid open system manually

1. Switch off main power. Wait till a rotor stops through RPM measuring window
2. As the below picture, turn a hole on the center of the front panel clockwise with T-wrench (6mm) to open a lid



4-1 Cleaning

1) Equipment outside

・Clean the outside of equipment with a soft and dry cloth. If the outside of equipment is contaminated, clean it with a soft soapy cloth. Then, clean the outside of equipment with a dry cloth to remove water
・Do not use chemicals such as alcohol, benzene and thinner that can damage products
Clean the damaged part with a cloth soaked with a good quality of a neutral detergent
・Make sure do not scratch the surface of equipment when cleaning it
Do not use a metal sponge
Make sure do not scratch the surface of equipment when moving it
Equipment can be rusty if the surface of equipment is scratched
・If equipment becomes rusty as it is left with water for long after use, remove rust with a neutral detergent and clean it with a dry cloth

2) Equipment inside

・Clean foreign substances on the inside of chamber or samples flowed out with a dry cloth to keep it clean

4. Cleaning and Maintenance

3) Drive shaft

• Drive shaft of centrifuge should be kept clean. In case rotation of shaft is unstable due to foreign substances, imbalance happens during high speed rotating
• Take a rotor out of a drive shaft and clean it with a dry cloth to remove water after use and keep it dry
• In case you do not use centrifuge, take a rotor out of a drive shaft and clean it with a dry cloth as a rotor can cause deformation of a shaft. Then, keep it dry upside down
• In case a rotor does not be pulled out of a drive shaft, do not try to take it out by force
Pull it out with tools that can ease pulling out

4) Rotor

① Corrosion of rotor and surface treatment

• If a rotor is exposed to acid or basic liquid, it gets damaged. In case rotor weight is imbalanced due to corrosion, serious vibration and noise can happen when high speed rotating. Furthermore, it can damage a drive shaft
• Rotor has good corrosion resistance in the atmosphere but its corrosion can be influenced by humidity, salt content and impurities volume in the atmosphere
• Rotor is resistant to neutral aqueous solution such as carbonate, chromate, acetate and sulfide, but it is not well resistant to chloride solution
Also, its corrosion is getting faster due to increase in hydrogen ion concentration and it is eroded by sulfuric acid and phosphoric acid and especially it is eroded faster by hydrochloric acid

② Rotor maintenance

• Cleaning
In case a rotor is exposed to sample coming out of tube, clean it with a soft cloth soaked with warm water immediately. At this moment, make sure do not scratch the surface specially treated
• Drying
Keep a narrow groove of a rotr dry with care. Hair dryer will be more effective for drying
• Keeping
Keep a rotor on a clean and dry place. Especially, a lid of angle rotor should be separated and keep its body upside down

③ Rotor sterilization and disinfection

Rotor, its lid and bucket can be autoclaved (121℃, 20mins)

4. Cleaning and Maintenance

4-2 Maintenance

1) Check and clean a rotor used for a centrifuge

2) General check points
Please check it out for the followings
- Shaft, spindle hub: do not separate a spindle hub or bend a shaft. Check whether they are worn out
- Motor bearing: Check whether it makes noise or rotates smoothly
- Control board(Main board): Check its connection and function
- Electrical connection: Check whether its connection is loosened
- Rotor: Check whether it is cracked, cleaned and worn out

3) Speed
Install a rotor relevant to a centrifuge and set RPM. Measure its actual RPM whith a tachometer

4) Time
Set time as 10 minutes and measure it with a stopwatch

5) Imbalance senser system
Check whether **Imbalance Error!** message with warning sound comes out before RPM eachs to the appointed value in case you operate a centrifuge with a imbalanced rotor

6) Lid lock system
1. If you close a lid, lock system operates and if you operate a centrifuge, door light is off and lid does not open though you press <DOOR> button
2. If lid opens, door light is on and a centrifuge does not operate
3. In case a lid closes and lock system is connected, switch power off and insert T-wrench (6mm) provided into an emergenc lid hole of the front panel and turn it clockwise to open a lid manually

7) Waste disposal
This centrifuge should not be scraped for household and you are forced to comply with local wastes laws

5. Troubleshooting

5-1 Warning light

Error No	Error message	Sensor range	Cause	Troubleshooting
E1	Motor start error		• Not reach to 200RPM within 2 seconds after motor runs	• Check connectors • Check installation of a rotor
E2	Door open error		• A lid opens during operation	• Check a lid lock chain and lid plate • Switch power on/off after it stops Operate it again
E3	Motor overheat	120℃(±5℃)	• Increase in the inside temperature of motor • Lack of bimetal cable	• Check temperature of motor stator • Switch power off and leave it for an hour and operate it again
E4	Low Speed	RPM (-10%)	• Below -10% of set RPM during operation	• Check electrical requirements of an outlet • Switch power on/off and operate it again
E5	Over speed	RPM (+10%)	• Over +10% of set RPM during operation	• Switch power on/off and operate it again Contact MRC customer service center •
E6	System error		• System error in controller	• Switch power on/off and operate it again • Contact MRC customer services
E7	Imbalance error		• Asymmetric arrangement of tubes • Asymmetric arrangement of tubes • Irregular sample volume of tubes • Rotor is not tightened completely on the motor shaft	• Check whether a rotor is tightened completely • Check whether tubes are arranged properly • Check whether equipment is installed on the safe worktable
E8	Lift door		• Error in reduction motor or lack of cables • lid does not open after operation finishes	• Check connectors • Open a lid manually through an emergency lid hole with a T-wrench
E9	Door lock error		• Error in lid lock sensor • Lack of senser cable	• Open a lid manually through an emergency lid hole with a T-wrench and operate it again • Check connectors
E10	Unknow Rotor ID		• No rotor • Error in drive or rotor sensing • Rotor is not detected • Foreign substances on rotor and sensor	• Install a rotor again • Remove foreign substances on rotor and sensor (Apply methyl alcohol(99%) to cotton swab) • Make a rotor detected repeatedly
E11	Imb Not, Connect		• Error in imbalance sensor or lack of cables	• Check connectors

* If you are not satisfied with the above troubleshootings, contact MRC customer service center

5. Troubleshooting

5-2 Additional errors

Error	Cause	Troubleshooting
No display	• Main power is not switched on • Display cable is disconnected	• Check power supply cable • Check main power fuse in the lab and main power fuse of equipment • Check display cable
No storing of program	• Error in system	• Contact MRC customer service center
No braking	• Error in system	Contact MRC customer service center •
Reaching to above or below set RPM during accelerating	• Error in setting values of main board	Contact MRC customer service center •
No pulling out a rotor	• Tight contact of between rotor and spindle hub due to poor cleaning	Contact MRC customer service center• •

6. Rotor and Accessories Guide

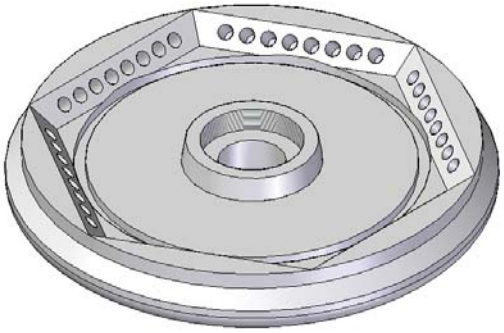
6-1 Rotor specification table

Capacity		Rotor	Rotor ID	MAX. RPM	MAX. RCF	MAX. R(mm)
Swing Rotors	500ml	S500T-4B	12	4,000	3,470	194
	750ml	S750T-4B	13	4,000	3,515	196.5
Angle Rotors	0.2ml	A0.2S-48	18	8,000	6,361	88.9
	1.5 / 2.0ml	A1.5S-24	1	8,000	5,781	80.8
	1.5 / 2.0ml	A1.5S-36	14	8,000	8,279	115.7
	10ml	A10S-12	2	8,000	6,089	85.1
	15ml	A15S-12	4	8,000	6,876	96.1
	15ml Conical	A15S-12C	8	8,000	7,105	99.3
	50ml	A50S-6	5	8,000	6,876	96.1
	50ml Conical	A50S-6C	6	8,000	6,576	91.9
	50ml	A50S-8	7	8,000	7,076	98.9
	85ml	A85S-6	9	8,000	6,597	92.2

6. Rotor and Accessories Guide

6-2 Rotor and accessories

A0.2S - 48 — Rotor ID : 18



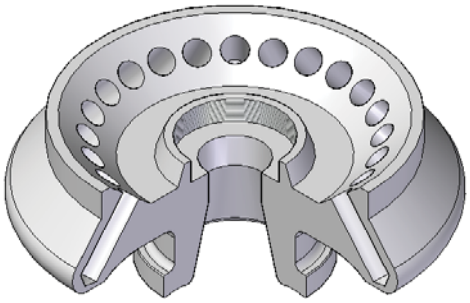
Type	:	Angle Rotor ∠45°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,361 xg
Radius	:	88.9mm
Dim. Ø/H	:	Ø200 x 56mm

Tube Capacity (ml)	0.2	0.2			
Dimensions Øx L mm	6 x 8	-			
Tube Type					
Adapter	-	-			
Tube per Rotor	48	6-tube Strips			
Max.RCF	6,361				
radius (mm)	88.9				
boring Ø x L mm	6.5 x 15				
Color / Material	-	-			
Max. length Ø x L	-	-			

6. Rotor and Accessories Guide

A1.5S - 24

Rotor ID : 1



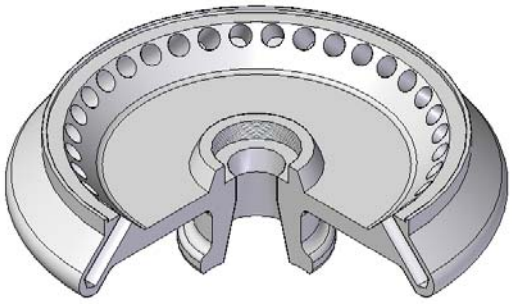
Type : Angle Rotor ∠40°
Max. RPM : 8,000 rpm
Max. RCF : 5,781xg
Radius : 80.8mm
Dim. Ø/H : Ø168 x 64mm

Tube Capacity (ml)	0.2	0.5	1.5	2.0	
Dimensions Øx L mm	6 x 18	8 x 30	11 x 38	11 x 38	
Tube Type					
Adapter			-	-	
Tube per Rotor	24				
Max.RCF	5,781				
radius (mm)	80.8				
boring Ø x L mm	6 x 21	8 x 37	11 x 37.5	11 x 37.5	
Color / Material	White	White	-	-	
Max. length Ø x L	11 x 45				

6 . Rotor and Accessories Guide

A1.5S - 36

Rotor ID : 14



Type	:	Angle Rotor ∠45°
Max. RPM	:	8,000 rpm
Max. RCF	:	8,279 xg
Radius	:	115.7 mm
Dim. Ø/H	:	Ø238.6 x 64mm

Tube Capacity (ml)	0.2	0.5	1.5	2.0	
Dimensions Øx L mm	6 x 18	8 x 30	11 x 38	11 x 38	
Tube Type					
Adapter			-	-	
Tube per Rotor	36				
Max.RCF	8,279				
radius (mm)	115.7				
boring Ø x L mm	6 x 21	8 x 37	11 x 37.5	11 x 37.5	
Color / Material	White	White	-	-	
Max. length Ø x L	11 x 45				

6. Rotor and Accessories Guide

A10S - 12

Rotor ID : 2

Type	:	Angle Rotor ∠36°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,089 xg
Radius	:	85.1 mm
Dim. Ø/H	:	Ø179.9 x 82mm

Tube Capacity (ml)	10				
Dimensions Øx L mm	16 x 82				
Tube Type					
Adapter	-				
Tube per Rotor	12				
Max.RCF	6,089				
radius (mm)	85.1				
boring Ø x L mm	16.3 x 74.5				
Color / Material	-				
Max. length Ø x L	16.3 x 87.4				

6. Rotor and Accessories Guide

A15S - 12

Rotor ID : 4

Type	:	Angle Rotor ∠25°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,876 xg
Radius	:	96.1 mm
Dim. Ø/H	:	Ø205 x 110mm

Tube Capacity (ml)	16				
Dimensions Øx L mm	18 x 100				
Tube Type					
Adapter	-				
Tube per Rotor	12				
Max.RCF	6,876				
radius (mm)	96.1				
boring Ø x L mm	19 x 96				
Color / Material	-				
Max. length Ø x L	19 x 109				

6. Rotor and Accessories Guide

A15S - 12C

Rotor ID : 8

Type	:	Angle Rotor ∠25°
Max. RPM	:	8 ,000 rpm
Max. RCF	:	7,105 xg
Radius	:	99.3mm
Dim. Ø/H	:	Ø219 x 122mm

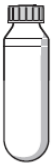
Tube Capacity (ml)	15				
Dimensions Øx L mm	17 x 120				
Tube Type					
Adapter	-				
Tube per Rotor	12				
Max.RCF	7,105				
radius (mm)	99.3				
boring Ø x L mm	17 x 115				
Color / Material	-				
Max. length Ø x L	17 x 121.5				

6. Rotor and Accessories Guide

A50S - 6

Rotor ID : 5

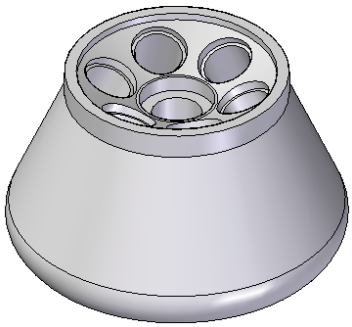
Type	:	Angle Rotor ∠30°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,876 xg
Radius	:	96.1 mm
Dim. Ø/H	:	Ø204.3 x 110 mm

Tube Capacity (ml)	50	50			
Dimensions Øx L mm	28.7 x 104	28.8 x 107			
Tube Type					
Adapter	-	-			
Tube per Rotor	6				
Max.RCF	6,876				
radius (mm)	96.1				
boring Ø x L mm	29 x 100				
Color / Material	-	-			
Max. length Ø x L	29 x 109				

6. Rotor and Accessories Guide

A50S - 6C

Rotor ID : 6



Type	:	Angle Rotor ∠23°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,576 xg
Radius	:	91.9 mm
Dim. Ø/H	:	Ø206.5 x 122 mm

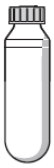
Tube Capacity (ml)	50				
Dimensions Øx L mm	29 x 115				
Tube Type					
Adapter	-				
Tube per Rotor	6				
Max.RCF	6,576				
radius (mm)	91.9				
boring Ø x L mm	29.5 x 108.6				
Color / Material	-				
Max. length Ø x L	29.5 x 116.5				

6. Rotor and Accessories Guide

A50S - 8

Rotor ID : 7

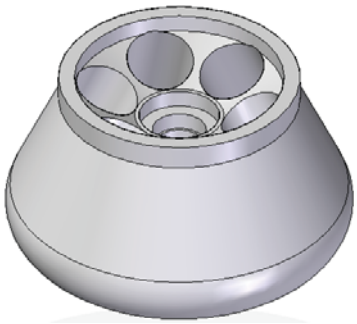
Type	:	Angle Rotor ∠30°
Max. RPM	:	8,000 rpm
Max. RCF	:	7,076 xg
Radius	:	98.9 mm
Dim. Ø/H	:	Ø213 x 110.7 mm

Tube Capacity (ml)	50	50			
Dimensions Øx L mm	28.7 x 104	28.8 x 107			
Tube Type					
Adapter	-	-			
Tube per Rotor	8				
Max.RCF	7,076				
radius (mm)	98.9				
boring Ø x L mm	29 x 100				
Color / Material	-	-			
Max. length Ø x L	29 x 109				

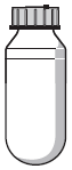
6 . Rotor and Accessories Guide

A85S - 6

Rotor ID : 9



Type	:	Angle Rotor ∠25°
Max. RPM	:	8,000 rpm
Max. RCF	:	6,597 xg
Radius	:	92.2 mm
Dim. Ø/H	:	Ø198.2 x 109mm

Tube Capacity (ml)	85				
Dimensions Øx L mm	38.2 x 105.7				
Tube Type					
Adapter	-				
Tube per Rotor	6				
Max.RCF	6,597				
radius (mm)	92.2				
boring Ø x L mm	38.5 x 90				
Color / Material	-				
Max. length Ø x L	38.5 x 110				

S500T- 4B Rotor ID : 12

Type : Swing Rotor ∠90°
Max. RPM : 4,000 rpm
Max. RCF : 3,470 xg
Radius : 194 mm
Dim. Ø/H : Ø300 x 55mm

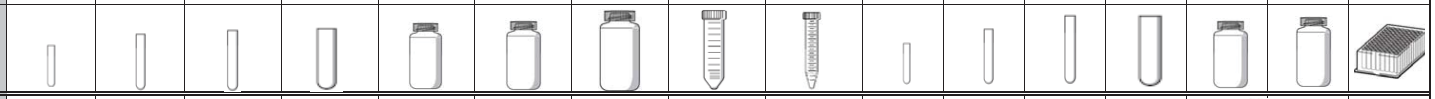
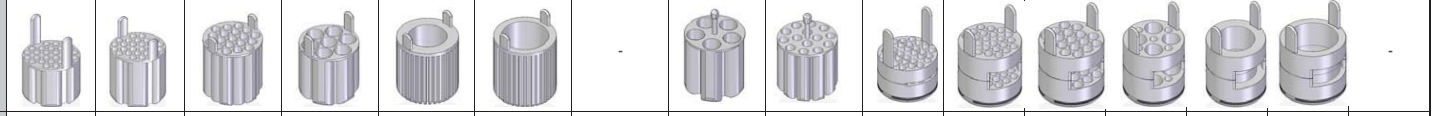
B500	B500 Lid	TM96-4S
Round Bucket 500ml capacity	Aerosol-tight lid	Deep well plate rack

Tube Capacity (ml)	5	10	15	50	100(85ml)	250	500	50	15	DWP
Dimensions Øx L mm	12 x 75	16 x 100	16 x 114	29 x 104	38 x 105.7	61.8 x 123		30 x 115	17 x 120	
Cat.NO.										
Tube Type										
Adapter										-
Tube per Adapter	9	9	9	4	1	1	1	3	7	-
Tube per Rotor	36	36	36	16	4	4	4	12	28	4
Max.RCF	3,363	3,381	3,390	3,390	3,390	3,390	3,434	3,399	3,408	2,755
radius (mm) / rpm	188/4,000	189/4,000	189.5/4,000	189.5/4,000	189.5/4,000	189.5/4,000	192/4,000	190/4,000	190.5/4,000	154/4,000
boring Ø x L mm	13 x 64	17 x 64	16.5 x 85	30 x 85.5	38.5 x 84.5	62 x 100	73 x 101	30 x 90	17 x 95.5	-
Color / Material	Green		Gray					Blue		-
Cat.NO.	TR5-9	TR10-9	TR15-9	TR50-4	TR100-1	TR250-1	TR500-1	TR50-3C	TR15-7C	-
Max. length Ø x L	13 x 150	17 x 151	16.5 x 151.5	30 x 151.5	38.5 x 151.5	62 x 151.5	73 x 154	30 x 152	17 x 152.5	-

S750T - 4B Rotor ID : 13

Type : Swing Rotor ∠90°
Max. RPM : 4,000 rpm
Max. RCF : 3,515 x g
Radius : 196.5 mm
Dim. Ø/H : Ø330.5 x 55mm

B750	B750 Lid	TM96-4S
Round Bucket 750ml capacity	Aerosol-tight lid	Deep well plate rack

Tube Capacity (ml)	5	10	15	50	250	500	750	50	15	5	10	15	50	250	500	DWP
Dimensions Øx L mm	12 x 75	13 x 100	16 x 114	29 x 104	61.8 x 123		97 x 152	30 x 115	17 x 120	12 x 75	13 x 100	16 x 114	29 x 104	61.8 x 123		
Cat.NO.																
Tube Type																
Adapter							-									-
Tube per Adapter	26	26	19	7	1	1	-	5	14	30	24	17	4	1	1	-
Tube per Rotor	104	104	76	28	4	4	1	20	56	120	29	68	16	4	4	4
Max.RCF	3,433	3,417	3,434	3,288	3,463	3,458	3,515	3,452	3,413	3,336	3,326	3,336	3,326	3,336	3,336	2,925
radius (mm) / rpm	191.9/4,000	191/4,000	192/4,000	183.8/4,000	193.6/4,000	193.3/4,000	196.5/4,000	193/4,000	190.8/4,000	186.5/4,00	186.5/4,00	186.5/4,00	186.5/4,00	186.5/4,00	186.5/4,00	163.5/4,000
boring Ø x L mm	13 x 70	13 x 89.5	17 x 99.5	29.2 x 81	62.2 x 99	75.5 x 99	99 x 105	29.5 x 99.5	17 x 89	13 x 55	13.5 x 80	17.3 x 80	29 x 80	62 x 80	74 x 80	-
Color / Material		Yellow	Green	White		Blue	-				Yellow	Green	White	Red	Blue	-
Cat.NO.	T5-26	T10-26	T15-19	T50-7	T250-1	T500-1	-	T50-5C	T15-14C	T5-30	T10-24	T15-17	T50-4	T250-1	T500-1	-
Max. length Ø x L	13 x 153.5	13 x 152.5	17 x 151	29.2 x 145	62.2 x 155	75.5 x 155	99 x 158	29.5 x 146.5	17 x 152	13 x 148	13.5 x 148	17.3 x 148	29 x 148	62 x 148	74 x 148	-